

Patent Application of

Mark Emery and

David D. Minor

For

TITLE: Sliding, Portable, Vehicle Mounted Combination Trunk-
Workbench with Variable Height Adjustment

CROSS REFERENCE TO RELATED APPLICATIONS

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FEDERALLY SPONSORED RESEARCH

Not Applicable

SEQUENCE LISTING OR PROGRAM

Not Applicable

BACKGROUND OF THE INVENTION—FIELD OF INVENTION

This invention relates to storage devices that can be mounted and utilized in the beds of trucks or similar vehicles, and easily accessed, removed and transported.

BACKGROUND OF THE INVENTION

The cargo carrying area of a pickup truck, van, or a sport utility vehicle is often referred to as the "bed". The present invention relates to an enclosed, compact, organized, storage cabinet installed in such a bed that readily converts to a portable, mobile workbench.

During certain types of transport it is desirable to include a storage container in a vehicle's bed. The storage container serves to retain tools, equipment, groceries or other items so as to allow the user of the vehicle to have ready access to those items at the destination. Hereafter the storage container shall be referred to as a toolbox.

Unfortunately, many available toolboxes in beds are positioned in poor locations. For example, some toolboxes require leaning over the sides of pickup trucks to see the contents, much less to lift them out and use them. Some toolboxes are in fixed positions mounted on the side panels in pickup trucks and are also difficult to access. Some toolboxes are mounted on the side panels in pickup trucks and can slide along the length of side panels, however, they remain difficult to access due to their height and the need to reach over the tailgate or side panels of the bed.

Additionally, very few of the toolboxes are mobile in a simple fashion once they are removed from the vehicle, and they do not provide rolling workbench functions.

BACKGROUND OF THE INVENTION—PRIOR ART

Various patents have been issued in the past that have described various types of bed mounted storage containers or toolboxes, and various patents have been issued for combined toolboxes and workbenches.

Early truck mounted toolboxes—for example, in U.S. patents 4,488,669 (1984) to Waters, 4,531,774 (1985) to Whatley, 4,967,944 (1990) to Waters, although of varying configurations and materials, were mounted on the side panels, permanently attached to the vehicle, difficult to access, and are not automatically closed when the tailgate is up. These devices have the additional disadvantage of protruding over the side panels, effectively eliminating the vehicle's capability of supporting toppers, and frequently adding to the exterior size of the vehicle.

Other early truck mounted toolboxes—for example, in U.S. patent 4,283,083 (1981) to Johnson, mounted an enclosure on the inside of a tailgate. This design has several disadvantages: when loaded it adds weight to the tailgate, is

very limited in size, irregular in shape, and permanently affixed to the vehicle.

Thereafter, truck mounted toolboxes—for example, in U.S. patents 4,635,992 (1987) to Hamilton et al, 4,705,315 (1987), 4,889,377 (1989) to Hughes, 5,088,636 (1992) to Barajas, 5,121,959 (1992) to King, 6,464,277 (2002) to Wilding, 6,607,230 (20003) to Voves, maintained the same basic configuration as early designs, but added the feature of allowing the toolbox to slide along rails affixed to the top or insides of the side panels. These devices are difficult to access, and are not automatically closed when the tailgate is up. These devices have the additional disadvantage of protruding over the side panels, in most cases effectively eliminating the vehicle's capability of supporting toppers, and frequently adding to the exterior size of the vehicle.

Several other methods for moveable truck mounted toolboxes—for example, in U.S. patent 5,398,987 (1995) Sturgis, an external box is affixed to a side panel inside the bed and the internal enclosure rotates out towards the rear of the bed. The disadvantages of this method are limited size, the permanently mounted stationary enclosure, and the difficult access reaching over the tailgate. In U.S. 6,015,177 (2000) to Tijerina, a toolbox is mounted on rails attached to the inner walls of the side panels that angle up and over the

wheel arches. The disadvantages of this method are difficulty in accessing the enclosure, difficulty lifting the enclosure over the wheel arches, and the non-automatic closure of the enclosure in its normal travel position. In U.S. 6,203,087 (2001) and 6,422,629 (2002) both to Lance et al, rear or front floor-mounted enclosures that are removable are proposed. The disadvantages of these proposals are the limited size of the enclosure, limited utility of the enclosure, and in the front mounted case, the difficulty of access. In U.S. 6,253,976 (2001) to Coleman et al, a side panel mounted sliding and rotating enclosure is proposed. The disadvantages of this proposal are the difficulty is accessing the enclosure, and intrusion of the rail system on other bed uses. In U.S. 6,464,274 (2002) to Mink et al, a sliding system mounted to the floor of the bed is proposed. The disadvantages of this system are it prevents using the bed for any other purposes, and the enclosure is not readily portable.

Combination toolbox and workbenches are also known-for example, in U.S. 4,369,822 (1983) to Rice, in U.S. 4,733,703 (1988) to Cimino, and 5,725,037 (1998) to Faulhaber, rolling workbench and toolbox combinations are proposed. The disadvantages of these proposals are they are not vehicle-mount ready, they have fixed size configurations, and limited ground clearance is provided.

Several methods have been proposed for lifting toolboxes or similar enclosures—for example, in U.S. 5,890,866 (1999) to Scheibel, a self-loading transporter is proposed. The primary objective of this device is moving, loading, and lifting a container into a vehicle. The disadvantages of this proposal are that it does not provide an anchored and ready access toolbox when in the vehicle, it does not provide workbench capabilities, and it prevents other uses of the bed when loaded. In U.S. 6,615, 973 (2003) to Fritter, a toolbox loading and unloading cart is proposed. The disadvantages of this proposal are that it has a fixed height, it does not provide toolbox or workbench capabilities, and it is not firmly affixed to the vehicle when loaded. In U.S. 4,936,624 (1990) to West, and 5,303,969 (1994) to Simnacher, permanently fixed systems are proposed for hydraulically lifting a toolbox within the confines of a vehicle. The disadvantages of these proposals are the permanence of the hydraulic systems, the difficulty of accessing the contents over the side panels, the limited functionality of the toolboxes, and the general complexity and cost of the hydraulics.

All of the vehicle mounted toolbox systems heretofore known suffer from some combination of the following disadvantages:

- (a) The toolboxes as described are not readily portable at a destination or jobsite.

- (b) The toolboxes as described are not readily reconfigurable to the proper height for workbench uses.
- (c) The toolboxes as described do not provide workbench capabilities.
- (d) The mounting systems within the vehicles do not allow for the use of the side panel rails for other normal purposes.
- (e) The mounting systems within the vehicles do not allow for the use of the main bed for other normal purposes.
- (f) Access to the contents of the toolboxes is difficult by virtue of mounting position, height, or reach.
- (g) The locking mechanism and subsequently the contents of the toolbox are not protected from tampering when the tailgate is closed.

BACKGROUND OF THE INVENTION-OBJECTS AND ADVANTAGES

The objects and advantages of the present invention hereafter referred to as the truck-bench are:

- (a) to provide a vehicle mounted toolbox that allows for convenient and easy access while mounted in the bed of a vehicle;
- (b) to provide a vehicle mounted toolbox that slides out over the tailgate of said vehicle;
- (c) to provide a vehicle mounted toolbox that is easily detached from said vehicle;

- (d) to provide a vehicle mounted toolbox that functions as a workbench;
- (e) to provide a vehicle mounted toolbox that is easily transportable;
- (f) to provide a vehicle mounted toolbox that functions as a rolling standalone toolbox when detached from said vehicle;
- (g) to provide a vehicle mounted toolbox whose height can be easily adjusted;
- (h) to provide a vehicle mounted toolbox that is protected from tampering when the tailgate is closed;
- (i) to provide a vehicle mounted toolbox that includes a quick-release safety belt to prevent sudden movement of said toolbox;
- (j) to provide a vehicle mounted toolbox that easily locks into place in said vehicle bed;
- (k) to provide a vehicle mounted toolbox that can be internally reconfigured for multiple functions.

SUMMARY

The present invention is a storage cabinet sized to be capable of being mounted to a rear floor portion of a vehicle having juxtaposed vehicle side panels, and juxtaposed wheel wells each having a portion that extends outwardly from its respective side panel by a first distance in a first

direction, and a rear vehicle tailgate that is moveable between a closed position and an open position, the tailgate being spaced from the rear portion of the wheel wells by a second distance in a second direction perpendicular to the first direction.

The storage unit comprises a cabinet having a length not greater than the width of the tailgate, a depth not greater than the second distance, with no portion of the cabinet extending outside of a space bounded by a horizontal plane coinciding with the rear portion of the wheel well, and a second vertical plane coinciding with the interior portion of the tailgate when the tailgate is in its closed position, and a height, in its normal position, not greater than a plane defining the top surfaces of the side panels.

The cabinet also comprises a hinged upper surface firmly attached to the rear vertical member of the cabinet that extends laterally beyond the side vertical members of the cabinet, and has gas struts to support it in the fully open position.

The cabinet also comprises a center storage section with a removable central divider, two hinged doors revealing the interior of the cabinet, and a first and second drawer disposed in the bottom portion of the cabinet in a side-by-side fashion.

Each of the drawers has a depth that is less than the second distance, and a length that is not greater than one half the length of the lower section of the cabinet.

The cabinet also comprises a plurality of drawer support members that support the drawers so that the drawers are moveable in a direction parallel to the length of the cabinet.

The cabinet also comprises two adjustable gas cylinder wheel assemblies each comprising a gas cylinder, cylinder actuator, wheel platform, and guide rods. The gas cylinders are fully enclosed and firmly attached at one end to the interior of the cabinet and at the other end to the wheel platform. The gas cylinders are positioned one at each end of the cabinet, and move in a vertical direction, perpendicular to the length of the cabinet. The cylinder actuators are integrated into the gas cylinders and are moved by depressing a button mounted in the upper end of each cylinder.

The wheel platforms each comprise a horizontal platform that is sized to fit in cutouts in the bottom portion of the cabinet and each have two fully articulating caster wheels firmly attached to the lower surface of platform. Each of the wheels may have a locking mechanism to prevent or allow rolling.

There are two guide rods for each wheel platform, firmly attached to the upper surface of the wheel platform, and

mounted parallel to the gas cylinders. Each guide rod slides vertically in and out of a corresponding guide hole in the body of the housing for the gas cylinder wheel assemblies.

The storage unit also has two retention members, one on each side, firmly affixed to the vehicle. The two retention members comprise brackets securely attached to the floor of the bed or side panels of the bed in the space not to exceed the first dimension or the second dimension.

The retention members also comprise cabinet support slides that support the cabinet and allow the cabinet to move in a direction parallel to the length of the bed between a stored position where no portion extends beyond a vertical plane defined by the interior surface of the tailgate in its closed position, and an extended position when the cabinet is positioned over the extent of the tailgate in its open position.

The retention members also comprise a retractable safety belt system. The rolling belt retractor is mounted on one of the retention members and the buckle fastener mounted on the paired retention member. The rolling belt threads through a firmly attached ring mounted on the rear vertical surface of the cabinet.

The features and advantages of the present invention will be apparent to those of ordinary skill in the art in view of

the detailed description of the preferred embodiments, which are made with reference to the drawings, a brief description of which is provided below.

DRAWINGS-FIGURES

FIG 1 is a partial cutaway view from above and in front of the trunk-bench as it would be mounted in a pickup truck.

FIG 2 is a perspective view of the standalone trunk-bench showing the configuration and basic inner workings.

FIG 3 is a perspective view of the L mounting brackets and support slides used to mount the trunk-bench in a vehicle.

FIG 4 is a perspective detail drawing of the gas cylinder mechanism, internal to the trunk-bench, that is used to raise and lower the trunk-bench, and details of the wheel platform.

FIG 5 is a perspective detail drawing of the pneumatic gas cylinder activating handle mechanism.

FIG 6 is a perspective detail drawing of the lower locking mechanism that is used to secure the box to the support slides and prevent the lower drawers from being opened.

FIG 7A is an elevation drawing of an alternative method for implementing the support slides.

FIG 7B is an orthogonal view of the alternative shown in FIG 7A.

FIG 8 is an elevation drawing of an alternative to the front of the trunk-bench showing hinged front opening panels.

DRAWINGS-Reference Numerals

10	side panels	11	floor
12	tailgate	14	cabinet
16	lid	18	mounting brackets
20	wheel platforms	22	lower support slides
24	upper support slides	26	lock cylinder/shaft
28	left locking rod	30	right locking rod
32	safety belt	34	quick release latch
36	D ring	38	safety belt retractor
40	hand holds	48	lid struts
50	gas cylinders	52	guide rods
54	actuator arms	62	caster wheels
64	lockable release handle	90	locking holes

DETAILED DESCRIPTION-FIGS. 1 - 8-PREFERRED EMBODIMENT

Referring more particularly to the drawings, a preferred embodiment of the present invention is shown in FIG 1 (perspective cutaway), as it would be mounted in a pickup truck bed. The body of the cabinet 14 is constructed of a sturdy material such as a durable plastic, aluminum or light gauge steel with appropriate internal bracing. It fits within the pickup side panels 10, and is attached to L mounting brackets 18 (shown in more detail in FIG 3) on each side using two very heavy duty support slides 22 lower, and 24 upper, on each side. The L mounting brackets are securely attached to the pickup bed 11 that has both vertical side panels 10 and a hinged tailgate 12. The drawer slides fully support the weight of the cabinet and allow the entire unit 14 to slide out over the tailgate 12 (as indicated by the arrows).

The lid 16 of the cabinet has a top surface that is smooth and flat with etched or marked vertical and horizontal scales 44, 42 for measuring. It also has two handholds 40, one on each side, that are used to facilitate moving the cabinet while in use. The upper surface would ideally be made of a non-abrasive, dent resistant metal such as stainless steel securely affixed to the main body of the lid. More details of the standalone cabinet and lid are shown in FIG 2.

The wheel platforms 20 are permanently and securely attached to the pneumatic gas cylinder and guide rods (shown in more detail in FIG 4) mounted inside the trunk-bench. The wheel platforms are raised and lowered by moving the left and right actuator arms 54. They are also attached to four lockable, caster wheels 62 securely mounted such that two wheels are mounted on the lower surface of each wheel platform 20 towards the ends. The four wheels extend below the lowest surface of the trunk-bench when the cabinet is fully lowered to allow access to several inches of vertical height for a variety of items (as shown in FIG 1). To assist with aligning the cabinet on the slider/rails as it is being installed, the wheels rest on the surface of the alignment ramps 46L, 46R. The alignment ramps fit into the pickup bed 11 grooves and are made of a light, durable and slightly rough substance to provide some rolling friction.

At the rear of the cabinet 14 is a retractable belt 32, similar to a seatbelt, that runs through a retaining D-ring 36 that is securely attached to the back of the cabinet. One end of the belt is attached to a belt retractor 38 that is securely mounted on the right side L mounting bracket 18R. The other end of the belt has a metal buckle 35 that plugs into the quick release connector 34 that is securely mounted

on the left side L mounting bracket **18L**. This arrangement is shown in more detail in FIG 3.

The entire cabinet **14** can be locked into the lower slide rails **22** on each side with the internally mounted locking rods **28, 30** and lock cylinder/shaft **26** (shown in more detail in FIG 6). The locking rods are actuated by the lock cylinder/shaft **26** in the front of the cabinet. Additionally, the two lower drawers **56L, 56R** can be locked at the same time by the U-rod **108** ends engaging the locking holes **110L, 110R**. When it is in the locked position, this entire locking mechanism prevents the cabinet from sliding on the rails and prevents the lower drawers from being opened.

The main cabinet **14** of the trunk-bench is shown in its dismounted and standalone configuration in FIG 2. The lid **16** has a hinge set **66** that runs the entire width of the back and one or two small lid gas struts **48** that keep the lid in its fully raised position. Furthermore, the lid contains a small compressible gasket **77** running along the perimeter that mates with the body of the main cabinet. Note also that both ends **68** of the lid **16** protrude over the edge of the cabinet far enough to cover the slide mechanisms and far enough to be used for workbench ends (for clamping, sawing, drilling, etc.). The lid is latched with the two lockable release handles **64**. These keep the lid secure and along with the gasket **77** sealed

against the elements. Lastly, the center removable panel 58 is shown in place. This panel can be removed to make a single long central storage area instead of two smaller ones.

FIG 2 also shows the motion of the various elements of the trunk-bench. The wheels 62 roll and pivot, and the wheel locks 63 pivot to/from locked/unlocked positions. The wheel platforms 20 on both sides slide up and down, driven by the motion of the gas cylinders 50. The gas cylinders move up and down respectively by up/down motion of the actuator handles 54. The drawers 56 slide in and out. The lid 16 pivots open and closed along its hinge point 66. Finally, the cabinet 14 slides in and out on the slides/rails 22, 24 mounted to the L mounting brackets 18.

FIG 3 shows details of the left L mounting bracket 18L, which is a mirror image of the right L mounting bracket 18R (with the exception of the retractable safety belt hardware 34, 38). The L mounting brackets are securely mounted to the floor of the pickup bed using heavy duty bolts or may be welded in place. In FIG 3, the body of the L mounting bracket 18L is made of hard and durable material such as steel and has two supporting angle brackets 72 for rigidity. At the rear of the bracket is a retaining ear 70L that prevents the cabinet 14 from moving forward inadvertently or in case of an accident. The retaining ear 70L provides a mounting point for

the quick release belt mechanism 34 and the other retaining ear 70R provides a mounting point for the belt retractor 38. The L mounting bracket has several tie-down holes 74 for general use with ropes or other fastening devices.

FIG 3 also shows the slides. The upper slide 24L is in its fully retracted position and the lower slide 22L is in its fully extended position. Drawer member 23L is the portion of the slide that is securely and permanently connected to the side of the cabinet 14. The slide stop 150L prevents overextension of the slide. When the cabinet 14 is in its fully retracted position the lock hole 90L in the slide aligns with the locking rod 28. In the locked position, the left locking rod 28 is fitted through the hole and into the slide mechanism.

FIG 4 shows details of the right wheel platform and pneumatic gas cylinder assembly 80R mounted in the right side of the cabinet. The left side is a mirror image of the right side. In this figure the wheel platform is approximately midway between the retracted and extended positions. The pneumatic gas cylinder 50 is permanently and securely affixed to the wheel platform 20 and to the upper support bracket 86. The actuator arm 54 is raised to depress the cylinder release button 55 and thereby extend, under no load, the cylinder or retract it, under a heavy load. To prevent the wheel platform

from twisting, guide rods 52 front and rear, move up and down in the rod guides 53. The rod guides are vertical holes drilled or formed in the guide mounting blocks 82, 84. Both guide rods and the lower portion of the gas cylinder move vertically in appropriately sized holes through the housing of the assembly 80. Similarly, the locking rod 30 moves back and forth laterally through the locking rod hole 90 drilled horizontally through the front guide mounting block 82 and the lower support slide 22.

FIG 5 shows details of the actuator arm 54, the top of the gas cylinder 50, and the cylinder release button 55. The actuator arm mechanism pivots around the orthogonal arm, depresses the cylinder release button, and is securely mounted to the inside of the assembly 80R using the mounting attachment 92.

FIG 6 shows details of the lower locking mechanism that secures the cabinet 14 by moving the locking rods 28, 30 horizontally through the holes 90 in the guide mounting blocks and subsequently through the holes 90 in the lower slides 22. The locking mechanism simultaneously pushes the U-rod 108 and the U-rod ends through the locking holes 110L, 110R in the drawer assemblies 56L, 56R. This action is accomplished by turning the mechanism of the lock cylinder/shaft 26 clockwise, which moves the lock actuator arm 100, and the lock cam 102.

When the pressure is released by turning the lock cylinder counterclockwise, the cam is forced up by the cam spring 106 exerting pressure on the U-rod plate 104 and thereby keeping the U-rod and locking rods retracted.

FIG 7A shows two elevation views of an alternative to the mounting slides 22, 24. In this case, two parallel C-channels 120L are securely mounted on the body of the cabinet 14 using mounting ears 126. A set of T-roller wheels 124 rolls in the C-channels and is supported by their shaft and bearing set 130. The bearing housing 122 is securely affixed to the L mounting brackets 18. Each of the C-channels has a quick release 123, end-stop 127 and inner/outer channels 125 similar to the slides 22, 24.

FIG 7B is an orthogonal view of the alternative shown in FIG 7A.

FIG 8 shows a front elevation of the cabinet 14 with two hinged access doors 140L, 140R. These doors have respectively hinges 142L, 142R along the length of their outside edges. For security purposes, they can only be opened after the lid 16 has been raised. Each door has friction locks on the lower center edges for positive locking and to assist in weather sealing.

Operation--FIGS 1, 2, 3, 4, 6, 8

The described invention is mounted in the bed of a vehicle using L mounting brackets 18. The cabinet 14 of the invention is attached to the L mounting brackets using support slides 22, 24 that have stops at the fully in and fully out positions. The cabinet can be moved in a horizontal fashion for the full range of travel of the slides by pulling on the front of the cabinet or pushing on it.

The cabinet 14 can be locked to the lower support slides 22, and the drawers 56 can be locked by turning the lock cylinder/shaft 26 clockwise $\frac{1}{4}$ of a turn. This action extends the locking rods 28, 30 and the drawer locking U-rod 108 into the appropriate locking holes 90, 110.

The cabinet 14 can be detached from the support slides 22, 24 by sliding out the slide locks 152 and pulling on the cabinet until it releases from the slides. Similarly the cabinet can be re-attached to the support slides by aligning it with the four support slides 22, 24 and pushing the cabinet onto the slides until it latches.

The cabinet 14 is raised by lifting both of the actuator handles 54, and letting the gas cylinders 50 push the cabinet up. Similarly, the cabinet can be lowered by lifting both of the actuator handles while simultaneously applying a downward force on the center of the cabinet.

The cabinet 14 can be secured with the retractable safety belt 32 by threading the belt through the D-ring 36 mounted on the rear surface of the cabinet, and inserting the buckle 35 into the quick release latch 34. The belt can be released by depressing the quick release latch button; it will subsequently retract.

The caster wheels 62 attached to the wheel platforms 20, can be locked to prevent rolling by depressing the wheel latches 63, and unlocked by reversing that motion.

Advantages

From the description above, a number of advantages of our invention become evident:

- (a) the position and shape of the entire trunk-bench system will allow for more truck bed utility than previous art;
- (b) the ability to easily remove the cabinet from the mounts will allow for more truck bed utility than previous art;
- (c) the ability to slide the cabinet out over the tailgate will improve access to the contents;
- (d) the ability to lock the cabinet to the support slides using the locking rods will improve the security of the cabinet and its contents;

- (e) the capabilities of the attached safety belt will improve the safety of those persons traveling in the vehicle or who may be around the vehicle whilst it is en route;
- (f) the over-latch of the lid will further improve the safety of the cabinet and its contents;
- (g) the position of the cabinet between the wheel wheels and the tailgate, with the latching and locking mechanisms against the inside of the tailgate will improve the security of the cabinet and its contents;
- (h) the ability of the cabinet to be raised or lowered on its gas cylinders will improve its functionality and provide greater utility;
- (i) the ability of the cabinet to be rolled about on its wheels both within the bed of the vehicle when not attached to its mounting brackets, and when dismounted from the vehicle will improve its functionality and provide greater utility;
- (j) the inherent overhang of the ends of the lid will provide for more utility especially when used as a workbench;

Conclusion, Ramifications, and Scope

Accordingly, the reader will see that the ability of this invention to slide in and out over the tailgate facilitates access to the contents of the cabinet. Further, the ability

to easily dismount the cabinet from the bed, raise it to the height of a workbench and roll it about further increases its utility. Other capabilities inherent in the design provide additional advantages in that:

- the mechanism for locking the cabinet to the support slides and simultaneously locking the internal drawers prevents access to the cabinet and its contents;
- the safety belt feature prevents sudden untoward movement of the cabinet;
- the design of the lid with protruding ends and an integrated scale facilitates workbench functions;
- the positioning of the cabinet against the inner surface of the tailgate and below the top surface of the side panels provides additional security for the cabinet and its contents.

Modifications and alternative embodiments of the invention will be apparent to those skilled in the art given the previous description. For example, the cylinder actuators can be cable actuated, the dual guide rods and single gas cylinders in each side may be replaced by dual gas cylinders, detachable saucer disks may be fitted to each wheel to facilitate sliding the cabinet across rough, soft or uneven terrain, the unit may be mounted in a different location in a vehicle, etc. This description is to be construed as

illustrative only, and is for the purpose of teaching those skilled in the art the best mode of carrying out the invention. The details of the structure and method may be varied substantially without departing from the spirit of the invention, and the exclusive use of all modifications that come within the scope of the appended claims is reserved.